



PYRAMID

IIT-JEE | MEDICAL | FOUNDATION

NEET TEST PAPER

Time : 3 Hrs.

Max. Marks : 720

Important Instructions :

1. The test is of 3 hours duration and Test Booklet contains 200 questions. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 720.
2. Use Black Ball point Pen only for writing particulars on this page/markings responses.
3. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
4. On completion of the test, the candidate must handover the Answer Sheet to the Invigilator before leaving the Room / Hall. The candidates are allowed to take away this Test Booklet with them.
5. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
7. Each candidate must show on demand his/her Admission Card to the Invigilator.
8. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
9. Use of Electronic/Manual Calculator is prohibited.
10. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
11. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.

Name of Student : _____

“ We are what we repeatedly do. Excellence, therefore, is not an act but a habit .”

Aristotle - Greek philosopher (384 BC - 322 BC)

PART – I [BOTANY]

1. Two crosses in which the source of gametes are reversed are called
 (A) Test cross
 (B) Reverse cross
 (C) Dihybrid cross
 (D) Reciprocal cross.

2. Human blood grouping is ABO instead of ABC because O in it refers to
 (A) No antigen on RBC
 (B) Other antigens besides A and B
 (C) Overdominance of its gene over A and B
 (D) One antibody only, either anti A or anti B.

3. R and Y genes of Maize lie very close to each other. When RRYY and rryy genotypes are hybridized, F₂ generation will show
 (A) Segregation in 9 : 3 : 3 : 1 ratio
 (B) Segregation in 3 : 1 ratio
 (C) Higher number of parental types
 (D) Higher number of recombination types.

4. A man whose father was colour blind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind?
 (A) 25% (B) 0%
 (C) 50% (D) 75%

5. In the following human pedigree, the filled symbols represent the affected individuals. Identify the type of given pedigree.

6. Purines found both in DNA and RNA are :
 (A) Guanine and cytosine
 (B) Cytosine and thymine
 (C) Adenine and thymine
 (D) Adenine and guanine

7. Spliceosome are not found in the cells of
 (A) Plants (B) Fungi
 (C) Animals (D) Bacteria

8. *Escherichia coli* cells with mutated z - gene of the lac operon cannot grow in medium containing only lactose as the source of energy because
 (A) *Lac* operon is constitutively active in these cells
 (B) They cannot synthesise functional beta-galactosidase
 (C) In the presence of glucose, *Escherichia coli* cannot utilize lactose
 (D) The bacterium cannot transport lactose from medium into cells.

9. In DNA finger printing, analysis is made of
 (A) Satellite DNA
 (B) Moderately repetitive sequence
 (C) Microsatellites
 (D) Variable number of tandem repeats.

10. Select the **correct** match :
- (A) Alec Jeffreys: *Streptococcus pneumoniae*
 (B) Alfred Hershey and Martha Chase : TMV
 (C) Matthew Meselson and F. Stahl : *Pisum sativum*
 (D) Francois Jacob and Jacques Monod: Lac operon

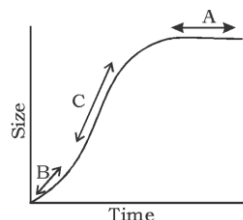
11. In CAM plants
- (A) Only C_3 enzymes are present in bundle sheath cells
 (B) Only C_4 enzymes are present in bundle sheath cells
 (C) Both C_3 and C_4 enzymes are present in leaf mesophyll cells
 (D) Both C_3 and C_4 enzymes are present in bundle sheath cells

12. Which statement is false about photosynthesis
- (A) The electron carriers involved in photophosphorylation are located in the thylakoid membranes
 (B) In the photosynthetic process, PS-II absorbs energy at 680 nm
 (C) The absorption spectrum of chlorophyll shows that some colours of light are absorbed more than the others
 (D) Compensation point of C_4 plant is higher than C_3 plants

13. What is total gain of ATP during aerobic respiration of one molecule of glucose in Eukaryotic cell
- (A) 32 ATP (B) 36 ATP
 (C) 34 ATP (D) 40 ATP

14. Number of molecules of CO_2 generated in ETS when reduced coenzymes from one glucose molecule are oxidized ?
- (A) Zero (B) 1
 (C) 12 (D) 24

15. Given graph is drawn on the parameters of growth versus times. Here A, B and C respectively represent



- (A) Exponential phase, log phase and steady state phase
 (B) Steady state phase, lag phase and log phase
 (C) Log phase, steady state phase and logarithmic phase
 (D) Log phase, lag phase and steady state phase

16. Match the column I and Column II

| | Column I | | Column II |
|---|-------------|---|--------------------|
| a | Auxin | p | GA_3 |
| b | Gibberellin | q | Indole Acetic acid |
| c | Cytokinin | r | Abcsisic acid |
| d | Dormin | s | Acetic acid |
| — | — | t | Zeatin |

- (A) a-q, b-r, c-p, d-t
 (B) a-q, b-s, c-p, d-t
 (C) a-q, b-p, c-t, d-r
 (D) a-q, b-t, c-p, d-t

17. The third name in trinomial nomenclature is
- (A) Species
 (B) Subgenus
 (C) Subspecies
 (D) Ecotype

- 18.** Which of the following organisms are known as chief producers in the oceans ?
 (A) Dinoflagellates (B) Diatoms
 (C) Cyanobacteria (D) Euglenoids
- 19.** Ciliates differ from all other protozoans in :
 (A) Using flagella for locomotion
 (B) Having a contractile vacuole for removing excess water
 (C) Using pseudopodia for capturing prey
 (D) Having two types of nuclei
- 20.** Which of the following are found in extreme saline conditions?
 (A) Archaeobacteria
 (B) Eubacteria
 (C) Cyanobacteria
 (D) Mycobacteria
- 21.** Viroids differ from viruses in having :
 (A) DNA molecules with protein coat
 (B) DNA molecules without protein coat
 (C) RNA molecules with protein coat
 (D) RNA molecules without protein coat
- 22.** Evolutionarily, the first terrestrial plants to possess vascular tissues are :
 (A) Bryophytes
 (B) Pteridophytes
 (C) Cycades
 (D) Gnetales
- 23.** Which of the following algae is likely to be found in the deepest waters ?
 (A) Green
 (B) Brown
 (C) Red
 (D) All are found at equal depths
- 24.** Zygotic meiosis is characteristic of :
 (A) *Marchantia*
 (B) *Fucus*
 (C) *Funaria*
 (D) *Chlamydomonas*
- 25.** The gemmae produced by some liverworts function as :
 (A) A water gathering structure
 (B) A light capturing structure
 (C) A sexual structure
 (D) An asexual structure
- 26.** In Jamikand, vegetative multiplication occurs through
 (A) Bulbils
 (B) Rhizome
 (C) Corm
 (D) Offset
- 27.** Flowers are unisexual in:
 (A) Cucumber (B) China rose
 (C) Onion (D) Pea
- 28.** Axile placentation is present in
 (A) Lemon
 (B) Pea
 (C) Argemone
 (D) Dianthus.

29. The most common type of ovule of angiosperms

- (A) Is orthotropous type
- (B) Is an upright ovule
- (C) Have micropyle close to hilum
- (D) Lacks embryo sac

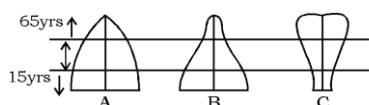
30. Which of the following structure guides the entry of pollen tube in embryo sac ?

- (A) Antipodal cells
- (B) Secondary nucleus
- (C) Filiform apparatus
- (D) Chalazal cells

31. Largest cell of egg apparatus is.

- (A) synergids (B) Egg cell
- (C) Central cell (D) antipodal

32. Given below population pyramids of three different populations A, B and C depicting the relationship between birth and death rates in each.



Which of the following is incorrect in reference of given pyramids :

- (A) Population B has slower growth rate than population A
- (B) Population C has birth rate higher than its death rate
- (C) Population A represents a rapidly growing population
- (D) Population B has highest death rate among the three population

33.
$$dN/dt = r N \left(\frac{K-N}{K} \right)$$

On the basis of above formula, the growth of organism will ultimately determine by

- (A) Only 'r'
- (B) Only 'K'
- (C) Both 'r' and 'K'
- (D) Neither 'r' nor 'K'

34. If we analyse the species-area relationships among very large areas like the entire continents, then slope of line becomes much steeper in the range of

- (A) 0.1 to 0.6
- (B) 0.1 to 0.2
- (C) 0.6 to 1.2
- (D) 0.2 to 0.6

35. Ozone depletion is occurring widely in the ..(A).. the depletion is particularly marked over the ...(B).. region

- (A) (A) Troposphere (B) Stratosphere
- (B) (A) Stratosphere (B) Troposphere
- (C) (A) Antarctic (B) Stratosphere
- (D) (A) Stratosphere (B) Antarctic

36. ZW/ZZ type of sex determination is seen in

- (A) Platypus (B) Snails
- (C) Cockroach (D) Peacock

37. The human chromosomes with the highest and least number of genes in them are respectively

- (A) Chromosome 21 and Y
- (B) Chromosome 1 and X
- (C) Chromosome a and Y
- (D) Chromosome X and Y

- 38.** The protons formed by splitting of water are released in the
 (A) Lumen of the thylakoids
 (B) Outer side of the membrane
 (C) Both (A) & (B)
 (D) Stroma of chloroplast
- 39.** Match the columns and find the correct combination
- | | Column I | | Column II |
|-----|-------------|---|-------------------------------|
| (A) | Diffusion | 1 | Hydrophilic substances |
| (B) | Osmosis | 2 | Shrinkage of protoplasm |
| (C) | Imbibition | 3 | Semipermeable membrane |
| (D) | Plasmolysis | 4 | Free movement of ions & gases |
- (A) A-2, B-1, C-4, D-3
 (B) A-3, B-1, C-4, D-2
 (C) A-2, B-3, C-4, D-1
 (D) A-4, B-3, C-1, D-2
- 40.** Which is not true regarding active water absorption ?
 (A) Require energy
 (B) Occurs only when transpiration is slow
 (C) Living cells essential
 (D) Force develops shoot
- 41.** Why is that in certain plants deficiency symptom appear first in young parts of the plant while in other they do so in mature organs
 (A) Deficiency symptoms occur first in young parts for elements which are relatively immobile inside the plants
 (B) Deficiency symptoms appear first in mature organs for those elements which are mobilised from senescing regions for supply to young regions
 (C) (A) & (B) both
 (D) None of the above
- 42.** Which of the following components provides sticky character to the bacterial cell ?
 (A) Cell wall
 (B) Nuclear membrane
 (C) Plasma membrane
 (D) Glycocalyx
- 43.** Which of the following is made up of dead cells?
 (A) Xylem parenchyma
 (B) Collenchyma
 (C) Phellem
 (D) Phloem
- 44.** Palisade parenchyma is absent in leaves of :-
 (A) Sorghum
 (B) Mustard
 (C) Soybean
 (D) Gram
- 45.** Reduction in vascular tissue, mechanical tissue and cuticle is characteristic of
 (A) Xerophytes
 (B) Mesophytes
 (C) Epiphytes
 (D) Hydrophytes
- 46.** Smaller animals tend to lose body heat very fast as compared to larger animals because they have
 (A) higher surface to volume ratio
 (B) Lower surface to volume ratio
 (C) Equal values of surface and volume
 (D) Very low BMR (Basal metabolic rate)

- 47.** Primary producer of deep sea hydrothermal vent ecosystem are :
- (A) Blue green algae
 - (B) Green algae
 - (C) Phytoplankton
 - (D) Chemosynthetic bacteria
- 48.** What would be most likely to happen, if decomposers (bacteria and fungi) become extinct on earth
- (A) Detrivores (such as earthworms) would replace them
 - (B) Primary productivity would increase
 - (C) Nutrients would accumulate in dead plants and animals become unavailable to living organisms
 - (D) Carnivores and herbivores would not be effected
- 49.** Using khan's technique by the year 2002, more than 40 kms of road in bangalore has been laid this road is the mixture of
- (A) Polyblend and plastic
 - (B) Polyblend and solid wastes
 - (C) Polyblend and bitumen
 - (D) Plastic and solid wastes
- 50.** Which of the following was related to significant reduction in the current rate of biodiversity loss at global, regional & local level ?
- (A) Kyoto protocol (1997)
 - (B) Montreal protocol (1987)
 - (C) Earth summit held in Rio de Janerio(1992)
 - (D) World summit on sustainable development held in Johannesburg (2002)

PART – II [ZOOLOGY]

51. In human females, the eggs are liberated from ovary ?
(A) Ovum
(B) Primary oocyte
(C) Oogonia
(D) Secondary oocyte
52. Which of the following depicts the **correct** presentation of various events during a **menstrual cycle** :-
(A) Menses → Secretory phase → Ovulation → Follicular phase
(B) Follicular phase → Ovulation → Menses → Luteal phase
(C) Luteal phase → Ovulation → Follicular phase → Menstruation
(D) Menstruation → Proliferative phase → Ovulation → Secretory phase
53. **Cleavage** is :
(A) The mitotic division starts as the zygote moves towards the uterus through Infundibulum of the fallopian tube.
(B) The meiosis division starts as the zygote moves towards the uterus through the isthmus of the oviduct
(C) The mitotic division starts as the zygote moves towards the uterus through the isthmus of the fallopian tube.
(D) The meiosis division starts as the zygote moves towards the uterus through the infundibulum of the oviduct
54. In India family planning programme was started in :
(A) 1955
(B) 1956
(C) 1947
(D) 1951
55. Which one of the following is a matching pair of an animal & a certain phenomenon it exhibits :-
(A) **Planaria** - High power of regeneration
(B) **Culex** - Incomplete metamorphosis
(C) **Obelia** - Metamerism
(D) **Pheretima** - Sexual dimorphism
56. In which of the following group notochord present in whole life ?
(A) Hemichordata
(B) Urochordata
(C) Cephalochordata
(D) Vertebrata
57. Which one of the following pairs is **not correctly** matched ?
(A) Choetopleura - Chiton
(B) Ascaris - Round worm
(C) Wuchereria - Filaria worm
(D) Enterobius - Hook worm
58. How many in the given examples of animals are **Coelentrates** :
Physalia, Obelia, Plannaria, Pennatula, Gorgonia, Pleurobrachia, Meandrina and Nereis.
(A) Three
(B) Four
(C) Five
(D) Six

59. Which of the following unicellular organism has a macronucleus for trophic function and one or more micronuclei for reproduction :

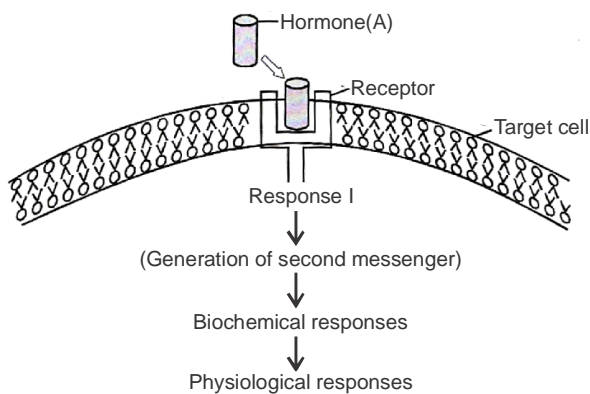
- (A) Trypanosoma (B) Paramecium
(C) Euglena (D) Amoeba

60. Which of the following pair is incorrect ?

- (a) Oxytocin - Stimulates uterine contraction during child birth
(b) ACTH - stimulates release of adrenaline from adrenal medulla
(c) Insulin - Stimulates glycogen breakdown in the liver
(d) Thyroxine - Stimulates metabolic process

- (A) c and d (B) b and c
(C) c only (D) a, c and d

61. In following hormonal mechanism hormone - A could be recognised as :



- (A) Thymosin (B) Progesterone
(C) Thyroxine (D) Cortisol

62. Here accessory excretory organs and their waste materials are given. Find out the **incorrectly** matching pair :

- (A) **Liver** = bilirubin, billiverdin and cholesterol
(B) **Lungs** = CO₂ and H₂O
(C) **Sebaceous gland** = NaCl, Urea and Lactic acid
(D) **Salivary gland** = small amount of nitrogenous wastes

63. Consider the following four statements (i) - (iv) and select the **correct option** stating which **ones** are **true (T)** and which **ones** are **false (F)** :

(A) When blood volume rises, the wall of atria of heart release ANF and it inhibits the release of renin and check on the renin angiotensin mechanism.

(B) Sebaceous glands eliminate certain substances like sterols, hydrocarbons and waxes through sweat and their primary function is to facilitate a cooling effect on the body surface.

(C) An excessive loss of fluid from the body can activate osmoreceptor which stimulate the hypothalamus to release Vasopressin or Antidiuretic hormone (ADH) from the neurohypophysis.

(D) Substances like glucose, amino acids, Na⁺, etc. in the filtrate are reabsorbed actively whereas the nitrogenous wastes are absorbed by passive transport.

Options :

- | | (A) | (B) | (C) | (D) |
|-----|-----|-----|-----|-----|
| (A) | F | T | T | F |
| (B) | T | T | F | F |
| (C) | F | F | T | T |
| (D) | T | F | T | T |

64. Read the following statements carefully and select the appropriate option given below.

(i) Muscle contraction is initiated by a signal sent by the central nervous system via a motor neuron.

(ii) A complex protein troponin is distributed at regular intervals on the tropomyosin.

(iii) Mechanism of muscle contraction states that contraction of thick filaments

takes place over the thin filaments.

(iv) The Z line attached to actins are pulled outward thereby causing a shortening of sarcomere during contraction.

(v) Red muscles contain plenty of mitochondria which can utilise the large amount of haemoglobin for ATP production.

(A) All are incorrect except (i) and (ii)

(B) All are incorrect except (ii) and (iii)

(C) All are incorrect except (iii) and (iv)

(D) All are incorrect except (iv) and (v)

65. Expiration takes place when the intrapulmonary pressure is :

(A) Greater than the atmospheric pressure

(B) Lesser than atmospheric pressure

(C) Equal to atmospheric pressure

(D) Equal to intrapleural pressure

66. Binding of oxygen with haemoglobin is **primarily** related to :-

(A) Partial pressure of O₂

(B) Partial pressure of CO₂

(C) H⁺ ion concentration

(D) Temperature

67. Who asserted that health as a state of body and mind where there was a balance of certain 'humors' :-

(A) Hippocrates

(B) Indian Ayurveda system of medicine

(C) William Harvey

(D) (A) and (B) both

68. Which of the following provide the sites for interaction of lymphocytes with the pathogen ?

(A) Bone marrow (B) Spleen

(C) Thymus gland (D) Lymph nodes

(E) Appendix

(F) Peyer's patches of small intestine

(A) B, C only (B) B, D, E, F

(C) B, D only (D) B, D, F only

69. A chemical carcinogen present in tobacco smoke is responsible for

(A) Skin cancer

(B) Pancreatic cancer

(C) Stomach cancer

(D) Lung cancer

70. Mark the correctly matched options :-

(A) Leaves of *Cannabis sativa* -



(B) Opium poppy -



(C) Flowering branch-



of *Datura*

(A) A and B

(B) B and C

(C) A, B and C

(D) Only C

71. Read the following statements :

(i) Acute chest pain appears

(ii) The heart stops beating

(iii) No enough oxygen is reaching the heart muscle

(iv) Congestion of the lungs is one of the main symptoms of this disease

(v) It is more common among the middle aged and elderly

(vi) It occurs due to conditions that affect the blood flow

How many statements **incorrect** about **Angina pectoris** ?

- (A) Two (B) Three
(C) Four (D) Five

72. In the given table which leucocytes is correctly matched with its shape of nucleus and their function ?

| | Leucocytes | Shape of nucleus | Function |
|-----|-------------|------------------|------------------------------------|
| (A) | Monocytes | Kidney shaped | Resist infections |
| (B) | Eosinophils | Large, Rounded | In allergic reactions |
| (C) | Basophils | S-shaped | involved in inflammatory reactions |
| (D) | Lymphocytes | Two-lobed | Phagocytic |

73. Five events in the transmission of nerve impulse across the synapse are given below :

A. Opening of specific ion channels allows the entry of ions in the post-synaptic neuron.

B. Neurotransmitter binds to the receptor on post synaptic membrane

C. Synaptic vesicle fuses with pre-synaptic membrane, neurotransmitter releases into synaptic cleft.

D. Depolarization of post-synaptic membrane

E. Arrival of action potential at axon terminal.

In which sequence to the events occur ?

- (A) E → C → B → A → D
(B) A → B → C → D → E
(C) A → B → D → C → E
(D) E → D → C → A → B

74. I. Cerebellum has very convoluted surface in order to provide the additional space for more neurons.

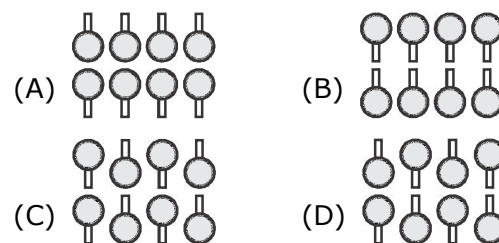
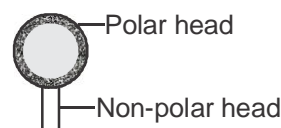
II. The medulla is connected to the spinal cord

III. Medulla contains controlling centres for respiration, cardiovascular reflexes and gastric secretion.

- (A) All are correct
(B) Only I is correct
(C) Only I and III are correct
(D) Only II is correct

75. The lipid molecules present in plasma membrane have polar heads and non-polar tails (as shows in figure).

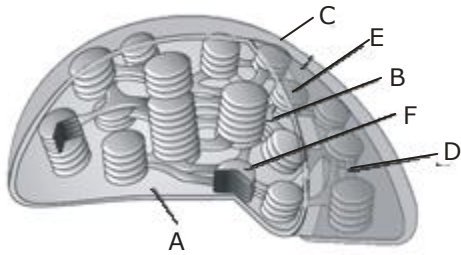
Which option represents the **correct** arrangement of lipids in lipid bilayer ?



76. Which of the following surface structure of bacteria take part in motility?

- (A) Flagella
(B) Pilli
(C) Fimbrae
(D) Cilia

77. Identify A to F in the given figure.



(A) A-Outer membrane, B-Thylakoid, C-Stroma lamella, D-Inner membrane, E-Granum, F-Stroma

(B) A-Thylakoid, B-Outer membrane, C-Stroma lamella, D-Inner membrane, E- Stroma, F-Granum

(C) A-Stroma, B-Granum, C-Outer membrane, D-Stroma lamella, E-Inner membrane, F-Thylakoid

(D) A-Inner membrane, B-Thylakoid, C-Stroma lamella, D-Outer membrane, E-Stroma, F- Granum

78. **Direction** : Refer the following statements describing prophase-I of meiosis :

(i) Thin thread like chromosomes with a beaded appearance.

(ii) Appearance of recombination nodules.

(iii) Formation of bivalents/tetrads.

(iv) Terminalisation of chiasmata.

(v) Appearance of chiasmata.

Arrange the given statement in the correct sequence of their occurrence during prophase-I

(A) (i) → (iii) → (ii) → (v) → (iv)

(B) (i) → (ii) → (iii) → (iv) → (v)

(C) (i) → (iv) → (v) → (ii) → (iii)

(D) (i) → (iii) → (ii) → (iv) → (v)

79. A parent cell has 16 chromosomes and 28 picogram DNA content. What must be the chromosome number and DNA content respectively in anaphase-II ?

(A) 8, 14

(B) 16, 14

(C) 8, 28

(D) 16, 28

80. Following statement describe the characteristics of the enzyme Restriction Endonuclease. Identify the **incorrect** statement.

(A) The enzyme cuts the sugar-phosphate backbone at specific sites on each strand.

(B) The enzyme recognizes a specific palindromic nucleotide sequence in the DNA.

(C) The enzyme cuts DNA molecule at identified position within the DNA.

(D) The enzyme binds DNA at specific sites and cuts only one of the two strands.

81. A gene whose expression helps to identify transformed cell is known as :

(A) Vector

(B) Plasmid

(C) Structural gene

(D) Selectable marker

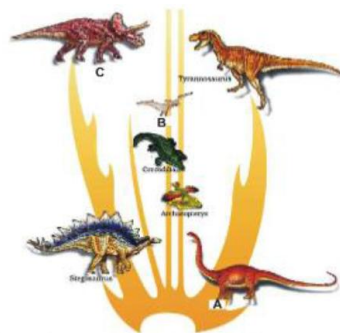
82. Match the organism with its use in biotechnology

| Column-I | | Column-II | |
|----------|----------------------------------|-----------|-------------------------------------|
| (a) | <i>Bacillus thuringiensis</i> | (i) | Cloning vector |
| (b) | <i>Thermus aquaticus</i> | (ii) | Construction of first rDNA molecule |
| (c) | <i>Agrobacterium tumefaciens</i> | (iii) | DNA polymerase |
| (d) | <i>Salmonella typhimurium</i> | (iv) | Cry proteins |

Select the **correct** option from the following :

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|------|
| (A) | (iv) | (iii) | (i) | (ii) |
| (B) | (iii) | (ii) | (iv) | (i) |
| (C) | (iii) | (iv) | (i) | (ii) |
| (D) | (ii) | (iv) | (iii) | (i) |
83. A 'new' variety of rice was patented by a foreign company, though such varieties have been present in India for a long time. This is related to :
- (A) Co-667
 (B) Sharbati Sonora
 (C) Lerma Rojo
 (D) Basmati
84. Which one produce gas by decomposing the gobar (Dung) in gobar gas :
- (A) Fungus
 (B) Virus
 (C) Methanogenic bacteria
 (D) Algae
85. Some nucleic acid behaves like enzymes are-
- (A) Ribozyme
 (B) Catalyst
 (C) t-RNA
 (D) Both B & C

86. Given below is the **family tree** of **Reptiles** and their living modern day counterpart organisms like Crocodiles, Birds. In this tree some counterparts are indicated as **A, B, C** and you have to select the option which is true for them



- (A) **A** -Ichthyosaurs, **B**-Birds, **C**-Mammals
 (B) **A**-Brachiosaurus, **B**-Pteranodon, **C**-Triceratops
 (C) **A**-Therapsid, **B**-Anapsid, **C**-Pteranodon
 (D) **A**-Anapsid, **B**-Therapsid, **C**-Pteranodon
87. Which of the following study is helpful to understand that all mammals share similarities in the pattern of bones of forelimbs?
- (A) Physiology and biochemistry
 (B) Taxonomy
 (C) Comparative anatomy and morphology
 (D) Biogeographical distribution
88. Which of the following statement is correct ?
- (A) The skull of adult chimpanzee is like modern adult human
 (B) The skull of baby chimpanzee is like modern adult human
 (C) Skull of baby chimpanzee is exactly similar to adult chimpanzee
 (D) Skull of baby chimpanzee and adult chimpanzee has no resemblance to skull of human

89. Read the following (A–D) Statements :

(A) Tight junctions help to stop substances from leaking across a tissue

(B) Adhering junctions perform cementing to keep neighbouring cells together

(C) The simple epithelium consists of two or more cell layers and has protective function

(D) The columnar epithelium is made of a single layer of fattened cells with irregular boundaries.

How many of the above statements are correct ?

(A) Four (B) Three

(C) Two (D) One

90. Which of the following statement is incorrect w.r.t malpighian tubules in cockroach ?

(A) They convert nitrogenous waste products into urea which is excreted out through hind gut

(B) Each tubule is lined by glandular and ciliated cells

(C) These are 100-150 blind yellow tubules present at the junction of midgut and hind gut

(D) They absorb urates salt from haemolymph.

91. Select the correct option to fill up the blanks in the following statements :

(i) Controlled breeding experiments are carried out using

(ii) In MOET technology, the fertilized eggs at cells stages, are recovered and transferred to surrogate mothers.

(iii) In MOET technology, the cow produces eggs instead of one egg.

(iv) is an industry devoted to the catching, processing or selling of fish.

(A) (i) artificial insemination, (ii) 8-32, (iii) 6-8, (iv) fisheries

(B) (i) Artificial insemination, (ii) 8-32, (iii) 6-8, (iv) silviculture

(C) (i) Artificial insemination, (ii) 6-8, (iii) 8-32, (iv) pisciculture

(D) (i) Artificial insemination, (ii) 4-8, (iii) 8-32, (iv) fisheries.

92. Dental formula of adult man is :

(A) $\frac{2,1,2,3}{2,1,2,3}$ (B) $\frac{2,1,2,3}{2,1,2,2}$

(C) $\frac{2,1,2,3}{2,1,2,4}$ (D) $\frac{2,1,3,2}{2,1,3,2}$

93. In jaundice, skin and eyes turn yellow due to the deposition of bile pigments. This disease is due to malfunctioning of which organ ?

(A) Liver (B) Intestine

(C) Brain (D) Pancreas

94. Given below is a list of glands. Find out correct match for them :

| | Hormone | Function |
|-----|----------------------------|---|
| (A) | Adrenal medulla | Hormone induces constriction in pupil and reduces sweating during emergency |
| (B) | α -cell of pancreas | Hormone acts on liver and induces glycogenolysis and gluconeogenesis |
| (C) | Testis | Hormone induces catabolic effect of proteins |
| (D) | Thyroid follicles | Hormone induces BMR and temperature regulation and binds with intranuclear receptors. |

95. Mark the **incorrect** statement regarding following animals and their characteristics :-

- (A) **Nereis** → Dioecious and parapodia for swimming
- (B) **Limulus** → Living fossil and respiration by book gills
- (C) **Echinus** → Endoskeleton of calcareous ossicles and water vascular system
- (D) **Balanoglossus** → Internal fertilisation and direct development

96. A fluid filled **Antrum cavity**, is characteristics of :

- (A) Primary follicle
- (B) Secondary follicle
- (C) Tertiary follicle
- (D) Graffian follicle

97. Select the correct statement for nucleolus.

- (A) It is a site for mRNA synthesis
- (B) Large and more numerous nucleoli are present in cells actively carrying out protein synthesis
- (C) Nucleolus contains nucleoplasm
- (D) Nucleolus is a single membrane bound structure

98. Genetic engineering has been successfully used for producing :

- (A) Animals like bulls for farm work as they have paper power
- (B) Transgenic mice for testing safety of polio vaccine before use in humans
- (C) Transgenic models for studying new treatments for certain cardiac diseases
- (D) Transgenic Cow-Rosie which produces high fat milk for making ghee

99. Hybrid vigour is due to :

- (A) Chiasma
- (B) Linkage
- (C) Crossing over
- (D) Heterozygosity

100. Find out wrongly matched pair :

- (A) Tuber — Potato
- (B) Leaf buds — Banana
- (C) Offsets — Water Hyacinth
- (D) Rhizome — Ginger

PART - III [PHYSICS]

SECTION-A

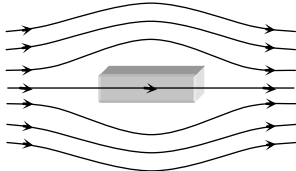
- 101.** The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?
 (A) 20 Hz (B) 30 Hz
 (C) 40 Hz (D) 10 Hz
- 102.** A spring of force constant k is cut in lengths of ratio 1 : 2 : 3. They are connected in series and the new force constant is k' . Then they are connected in parallel and force constant is k'' . Then $k' : k''$ is :-
 (A) 1 : 9 (B) 1 : 11
 (C) 1 : 14 (D) 1 : 16
- 103.** Two cars moving in opposite directions approach each other with speed of 22 m/s and 16.5 m/s respectively. The driver of the first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is [velocity of sound 340 m/s] :-
 (A) 361 Hz (B) 411 Hz
 (C) 448 Hz (D) 350 Hz
- 104.** Planck's constant (h), speed of light in vacuum (c) and Newton's gravitational constant (G) are three fundamental constant. Which of the following combinations of these has the dimension of length ?
 (A) $\sqrt{\frac{hc}{G}}$ (B) $\sqrt{\frac{Gc}{h^{3/2}}}$
 (C) $\frac{\sqrt{hG}}{c^{3/2}}$ (D) $\frac{\sqrt{hG}}{c^{5/2}}$
- 105.** When two displacement represented by $y_1 = a \sin(\omega t)$ and $y_2 = b \cos(\omega t)$ are superimposed the motion is :
 (A) simple harmonic with amplitude $\frac{a}{b}$
 (B) simple harmonic with amplitude $\sqrt{a^2 + b^2}$
 (C) simple harmonic with amplitude $\frac{(a+b)}{2}$
 (D) not a simple harmonic
- 106.** A particle is moving such that its position coordinate (x, y) are
 (2m, 3m) at time $t = 0$
 (6m, 7m) at time $t = 2$ s and
 (13m, 14m) at time $t = 5$ s.
 Average velocity vector (\vec{V}_{av}) from $t = 0$ to $t = 5$ s is :
 (A) $\frac{1}{5}(13\hat{i} + 14\hat{j})$ (B) $\frac{7}{3}(\hat{i} + \hat{j})$
 (C) $2(\hat{i} + \hat{j})$ (D) $\frac{11}{5}(\hat{i} + \hat{j})$
- 107.** A projectile is fired from the surface of the earth with a velocity of 5 ms^{-1} and angle θ with the horizontal. Another projectile fired from another planet with a velocity of 3 ms^{-1} at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is (in ms^{-2}) is : (given $g = 9.8 \text{ m/s}^2$)
 (A) 3.5 (B) 5.9
 (C) 16.3 (D) 110.8
- 108.** A balloon with mass ' m ' is descending down with an acceleration ' a ' (where $a < g$). How much mass should be removed from it so that it starts moving up with an acceleration ' a '?
 (A) $\frac{2ma}{g+a}$ (B) $\frac{2ma}{g-a}$
 (C) $\frac{ma}{g+a}$ (D) $\frac{ma}{g-a}$

- 109.** A particle is moving along x-axis has acceleration f , at time t , given by $f = f_0 \left(1 - \frac{t}{T}\right)$, where f_0 and T are constants. The particle at $t = 0$ has zero velocity. In the time interval between $t = 0$ and the instant when $f = 0$, the particle velocity (v_x) is
- (A) $\frac{1}{2} f_0 T$ (B) $f_0 T$
 (C) $\frac{1}{2} f_0 T^2$ (D) $f_0 T^2$
- 110.** A mass m moving horizontally (along the x-axis) with velocity v collides and sticks to mass of $3m$ moving vertically upward (along the y-axis) with velocity $2v$. The final velocity of the combination is :
- (A) $\frac{1}{4} v\hat{i} + \frac{3}{2} v\hat{j}$ (B) $\frac{1}{3} v\hat{i} + \frac{2}{3} v\hat{j}$
 (C) $\frac{2}{3} v\hat{i} + \frac{1}{3} v\hat{j}$ (D) $\frac{3}{2} v\hat{i} + \frac{1}{4} v\hat{j}$
- 111.** From a disc of a radius R and mass M , a circular hole of diameter R , whose rim passes through the centre is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis, passing through the centre?
- (A) $15 MR^2/32$ (B) $13 MR^2/32$
 (C) $11 MR^2/32$ (D) $9 MR^2/32$
- 112.** Three masses are placed on the x-axis, 300 g at origin 500 g at $x = 40$ cm and 400 g at $x = 70$ cm. The distance of the centre of mass from the origin is
- (A) 40 cm (B) 45 cm
 (C) 50 cm (D) 30 cm
- 113.** If v_e is escape velocity and v_0 is orbital velocity of a satellite for orbit close to the earth's surface, then these are related by :
- (A) $v_e = \sqrt{2}v_0$ (B) $v_e = \sqrt{2}v_0$
 (C) $v_0 = \sqrt{2}v_e$ (D) $v_0 = v_e$
- 114.** A particle is thrown with escape velocity v_e from the surface of earth. Calculate its velocity at height $3R$:-
- (A) = 9.25 km/s (B) = 5.6 km/s
 (C) = 11.2 km/s (D) = 4.3 km/s
- 115.** An aluminium sphere of 20 cm diameter is heated from 0°C to 100°C . Its volume changes by (given that coefficient of linear expansion for aluminium $\alpha_{Al} = 23 \times 10^{-6} / ^\circ\text{C}$)
- (A) 28.9 cc (B) 2.89 cc
 (C) 9.28 cc (D) 49.8 cc
- 116.** When a large bubble rises from the bottom of a lake to the surface, its radius doubles. If atmospheric pressure is equal to that of column of water height H , then the depth of lake is :
- (A) H (B) $2H$
 (C) $7H$ (D) $8H$
- 117.** The total weight of a piece of wood is 6 kg. In the floating state in water its $\frac{1}{3}$ part remains inside the water. On this floating solid, what maximum weight is to be put such that whole of the piece of wood is drowned in the water?
- (A) 12 kg (B) 10 kg
 (C) 14 kg (D) 15 kg
- 118.** Density of substance at 0°C is 10 gm/cc and at 100°C , its density is 9.7 gm/cc. The coefficient of linear expansion of the substance will be
- (A) 10^2 (B) 10^{-2}
 (C) 10^{-3} (D) 10^{-4}
- 119.** An electron is travelling in east direction and a magnetic field is applied in upward direction then electron will deflect in
- (A) South (B) North
 (C) West (D) East
- 120.** A current carrying circular loop is freely suspended by a long thread. The plane of the loop will point in the direction
- (A) Wherever left free
 (B) North-south
 (C) East-west
 (D) At 45° with the east-west direction

121. If a magnet is suspended at an angle 30° to the magnetic meridian, it makes an angle of 45° with the horizontal. The real dip is

- (A) $\tan^{-1}(\sqrt{3}/2)$ (B) $\tan^{-1}(\sqrt{3})$
 (C) $\tan^{-1}(\sqrt{3/2})$ (D) $\tan^{-1}(2/\sqrt{3})$

122. The given figure represents a material which is



- (A) Paramagnetic (B) Diamagnetic
 (C) Ferromagnetic (D) None of these

123. An infinitely long cylinder is kept parallel to a uniform magnetic field B directed along positive z axis. The direction of induced current as seen from the z axis will be

- (A) Clockwise of the +ve z axis
 (B) Anticlockwise of the +ve z axis
 (C) Zero
 (D) Along the magnetic field

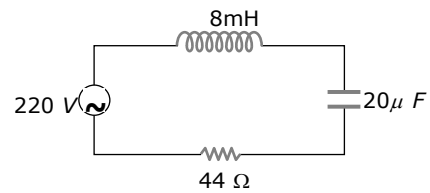
124. In a magnetic field of $0.05T$, area of a coil changes from 101cm^2 to 100cm^2 without changing the resistance which is 2Ω . The amount of charge that flow during this period is

- (A) 2.5×10^{-6} coulomb (B) 2×10^{-6} coulomb
 (C) 10^{-6} coulomb (D) 8×10^{-6} coulomb

125. In a circuit L, C and R are connected in series with an alternating voltage source of frequency f . The current leads the voltage by 45° . The value of C is

- (A) $\frac{1}{2\pi f(2\pi fL + R)}$
 (B) $\frac{1}{\pi f(2\pi fL + R)}$
 (C) $\frac{1}{2\pi f(2\pi fL - R)}$
 (D) $\frac{1}{\pi f(2\pi fL - R)}$

126. For the series LCR circuit shown in the figure, what is the resonance frequency and the amplitude of the current at resonance



- (A) $2500\text{rad} - \text{s}^{-1}$ and $5\sqrt{2}\text{A}$
 (B) $2500\text{rad} - \text{s}^{-1}$ and 5A
 (C) $2500\text{rad} - \text{s}^{-1}$ and $\frac{5}{\sqrt{2}}\text{A}$
 (D) $25\text{rad} - \text{s}^{-1}$ and $5\sqrt{2}\text{A}$

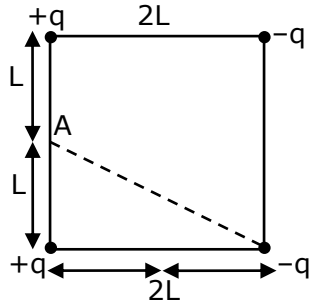
127. The work function of a metal is $1.6 \times 10^{-19}\text{J}$. When the metal surface is illuminated by the light of wavelength 6400 \AA , then the maximum kinetic energy of emitted photo-electrons will be (Planck's constant $h = 6.4 \times 10^{-34}\text{Js}$)

- (A) $14 \times 10^{-19}\text{J}$
 (B) $2.8 \times 10^{-19}\text{J}$
 (C) $1.4 \times 10^{-19}\text{J}$
 (D) $1.4 \times 10^{-19}\text{eV}$

128. An electron and proton have the same de-Broglie wavelength. Then the kinetic energy of the electron is

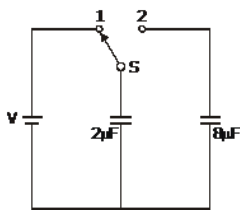
- (A) Zero
 (B) Infinity
 (C) Equal to the kinetic energy of the proton
 (D) Greater than the kinetic energy of the proton

- 129.** Four electric charges $+q$, $+q$, $-q$ and $-q$ are placed at the corners of a square of side $2L$ (see figure). The electric potential at point A, mid way between the two charges $+q$ and $+q$, is



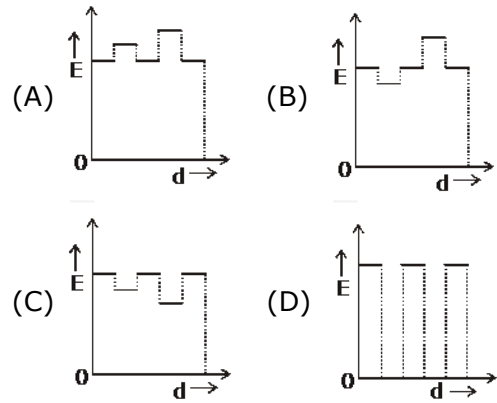
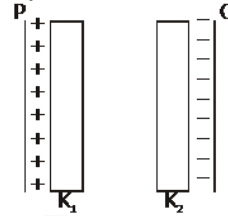
- (A) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 + \frac{1}{\sqrt{5}}\right)$
 (B) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 - \frac{1}{\sqrt{5}}\right)$
 (C) zero
 (D) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} (1 + \sqrt{5})$

- 130.** A capacitor of $2 \mu\text{F}$ is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is :



- (A) 0%
 (B) 20%
 (C) 75%
 (D) 80%

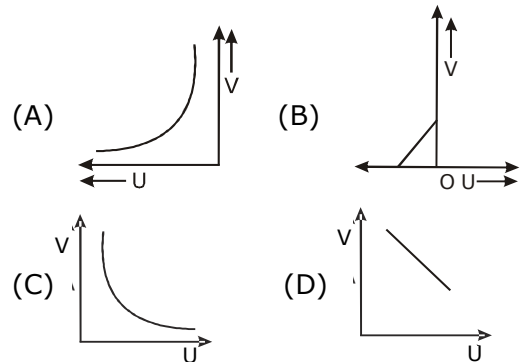
- 131.** Two thin dielectric slabs of dielectric constants K_1 and K_2 , ($K_1 < K_2$) are inserted between the plates of a parallel plate capacitor, as shown in the figure alongside. The variation of electric field E between the plates with distance d as measured from plate P is correctly shown by



- 132.** A 100 V voltmeter of internal resistance $20 \text{ k}\Omega$ in series with a high resistance R is connected to 110 V line. The voltmeter reads 5V, the value of R is
 (A) $210 \text{ k}\Omega$ (B) $315 \text{ k}\Omega$
 (C) $420 \text{ k}\Omega$ (D) $4440 \text{ k}\Omega$

- 133.** Dimensions of capacitance are
 (A) $[M^{-1}L^{-2}T^4A^2]$ (B) $[MLT^{-3}A^{-1}]$
 (C) $[ML^{-2}T^{-3}A^{-1}]$ (D) $[M^{-1}L^{-2}A^{-1}]$

- 134.** The graph between the image distance (v) and object distance (u) from the convex lens is



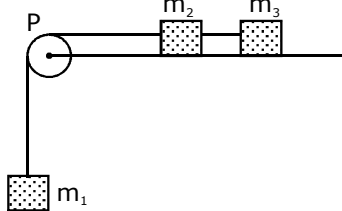
- 135.** A lens has one concave surface of $R_1 = 2$ m and convex surface with $R_2 = 3$ m then focal length of lens is (If $\mu_r = 1.5$)
 (A) 12 m (B) - 12 m
 (C) 24 m (D) - 6 m

SECTION-B

- 136.** A ship A is moving westwards with a speed of 10 kmh^{-1} and a ship B, 100 km south of A, is moving Northwards with a speed of 10 kmh^{-1} . The time after which the distance between them becomes shortest, is -
 (A) $10\sqrt{2}$ h (B) 0 h
 (C) 5 h (D) $5\sqrt{2}$ h

- 137.** A block of mass M is attached to the lower end of a vertical spring. The spring is hung from a ceiling and has force constant value k. The mass is released from rest with the spring initially unstretched. the maximum extension produced in the length of the spring will be :-
 (A) $Mg/2k$ (B) Mg/k
 (C) $2 Mg/k$ (D) $4 Mg/k$

- 138.** A system consists of three masses m_1 , m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and is of negligible mass. The downward acceleration of mass m_1 is - (Assume $m_1 = m_2 = m_3 = m$)



- (A) $\frac{g(1-2\mu)}{9}$
 (B) $\frac{2g\mu}{3}$
 (C) $\frac{g(1-2\mu)}{3}$
 (D) $\frac{g(1-2\mu)}{2}$

- 139.** Two rods one of aluminium of length ℓ_1 having coefficient of linear expansion α_a and other of steel of length ℓ_2 having coefficient of linear expansion α_s are joined end to end. The expansion in both the rods is same for the same variation of temperature. Then the value of $\frac{\ell_1}{\ell_1 + \ell_2}$ is

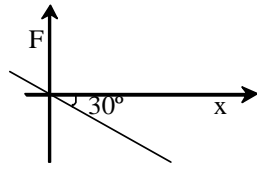
- (A) $\frac{\alpha_s}{\alpha_a + \alpha_s}$ (B) $\frac{\alpha_a}{\alpha_a + \alpha_s}$
 (C) $\frac{\alpha_a}{\alpha_s}$ (D) $\frac{\alpha_s}{\alpha_a}$

- 140.** Two rigid boxes containing different ideal gases are placed on table. Box A contains one mole of nitrogen at temperature T_0 while box B contains one mole of helium at temperature $(7/3) T_0$. The boxes are then put into thermal contact with each other, and heat flows between them until the gas reach a common final temperature (ignore the heat capacity of boxes). Then, the final temperature of the gases T_f in terms of T_0 is

- (A) $T_f = \frac{3}{7} T_0$ (B) $T_f = \frac{7}{3} T_0$
 (C) $T_f = \frac{3}{2} T_0$ (D) $T_f = \frac{5}{2} T_0$

- 141.** In Maxwell's velocity distribution curve area under the graph
 (A) Increases when temperature is increased
 (B) Decreases when temperature is increased
 (C) remains same at all temperature
 (D) depends on the pressure of the gas

- 142.** The force constant between the restoring force F and displacement x of a spring according to the graph shown will be



- (A) $\sqrt{3}$ (B) $\sqrt{3}/2$
 (C) $1/2$ (D) $1/\sqrt{3}$
- 143.** Energy generation in stars is mainly due to
 (A) Chemical reactions
 (B) Fission of heavy nuclei
 (C) Fusion of light nuclei
 (D) Fusion of heavy nuclei
- 144.** β -rays emitted by a radioactive material are
 (A) Electromagnetic radiation
 (B) The electrons orbiting around the nucleus
 (C) Charged particles emitted by nucleus
 (D) Neutral particles
- 145.** If n_e and n_h are the number of electrons and holes in a semiconductor heavily doped with phosphorus, then
 (A) $n_e \gg n_h$ (B) $n_e \ll n_h$
 (C) $n_e \leq n_h$ (D) $n_e = n_h$
- 146.** The band gap in Germanium and silicon in eV respectively is
 (A) 0.7, 1.1 (B) 1.1, 0.7
 (C) 1.1, 0 (D) 0, 1.1

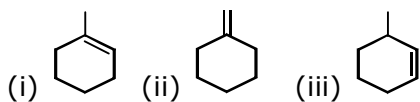
- 147.** A common emitter amplifier is designed with NPN transistor ($\alpha = 0.99$). The input impedance is $1 \text{ K}\Omega$ and load is $10 \text{ K}\Omega$. The voltage gain will be
 (A) 9.9 (B) 99
 (C) 990 (D) 9900
- 148.** Find range of resistance having ring of Red, Orange, Gray, Silver colour
 (A) $23 \times 10^8 \pm 10\%$
 (B) $23 \times 10^7 \pm 10\%$
 (C) $23 \times 10^9 \pm 10\%$
 (D) $34 \times 10^9 \pm 10\%$
- 149.** In an interference of light derived from two slit apertures, if at some point on the screen, yellow light has a path difference of $\frac{3\lambda}{2}$, then the fringe at that point will be :
 (A) yellow in colour (B) white in colour
 (C) dark (D) bright
- 150.** Diffraction of light is observed only, when the obstacle size is -
 (A) Very large
 (B) Very small
 (C) Of the same order that of wavelength of light
 (D) Any size

PART - IV [CHEMISTRY]

SECTION_A

- 151.** In a face centered lattice of X and Y, X atoms are present at the corners while Y atoms are at face centers. Then the formula of the compound is :
- (A) XY_3 (B) X_2Y_3
 (C) X_3Y (D) XY
- 152.** A solution of a substance containing 1.05 g per 100 mL. was found to be isotonic with 3% glucose solution. The molecular mass of the substance is :
- (A) 31.5 (B) 6.3
 (C) 630 (D) 63
- 153.** Which has maximum internal energy at 290 K ?
- (A) Neon gas (B) Nitrogen gas
 (C) Ozone gas (D) Equal
- 154.** Which of the following has the highest degree of ionisation ?
- (A) 1 M NH_3 (B) 0.001 M NH_3
 (C) 0.1 M NH_3 (D) 0.0001 M NH_3 .
- 155.** A 50 ml solution of strong acid of pH = 1 is mixed with a 50 ml solution of strong acid of pH = 2. The pH of the mixture will be nearly ($\log 5.5 = 0.74$)
- (A) 0.74 (B) 1.26
 (C) 1.76 (D) 1.5
- 156.** Heat of hydrogenation of ethene is x_1 and that of benzene is x_2 . Hence, resonance energy is :
- (A) $x_1 - x_2$ (B) $x_1 + x_2$
 (C) $3x_1 - x_2$ (D) $x_1 - 3x_2$
- 157.** $\log \frac{K_p}{K_c} + \log RT = 0$ is a relationship for the reaction :
- (A) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$
 (B) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
 (C) $H_2 + I_2 \rightleftharpoons 2HI$
 (D) $N_2 + 3H_2 \rightleftharpoons 2NH_3$
- 158.** Which of the following is a redox reaction:
- (A) $2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$
 (B) $CuSO_4 + 4NH_3 \rightarrow [Cu(NH_3)_4]SO_4$
 (C) $2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$
 (D) $Cr_2O_7^{2-} + 2OH^- \rightarrow 2CrO_4^{2-} + H_2O$
- 159.** The density of neon will be highest at :
- (A) STP
 (B) $0^\circ C, 2 \text{ atm}$
 (C) $273^\circ C, 1 \text{ atm}$
 (D) $273^\circ C, 2 \text{ atm}$
- 160.** No. of visible lines when an electron returns from 5th orbit to ground state in H spectrum :
- (A) 5 (B) 4 (C) 3 (D) 10
- 161.** Under the same conditions, two gases have the same number of molecules. They must
- (A) be noble gases
 (B) have equal volumes
 (C) have a volume of 22.4 dm^3 each
 (D) have an equal number of atoms
- 162.** 64 g of an organic compound has 24 g carbon and 8 g hydrogen and the rest is oxygen. The empirical formula of the compound is
- (A) CH_4O (B) CH_2O
 (C) C_2H_4O (D) None
- 163.** The increasing order of stability of the following free radicals is :
- (A) $(C_6H_5)_3\dot{C} < (C_6H_5)_2\dot{C}H < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$
 (B) $(C_6H_5)_2\dot{C}H < (C_6H_5)_3\dot{C} < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$
 (C) $(CH_3)_2\dot{C}H < (CH_3)_3\dot{C} < (C_6H_5)_3\dot{C} < (C_6H_5)_2\dot{C}H$
 (D) $(CH_3)_2\dot{C}H < (CH_3)_3\dot{C} < (C_6H_5)_2\dot{C}H < (C_6H_5)_3\dot{C}$

164. Compare heat of hydrogenation of the following :



- (A) $i > ii > iii$ (B) $iii > ii > i$
 (C) $ii > iii > i$ (D) $ii > i > iii$

165. Ortho-nitrophenol is less soluble in water than p- and m-nitrophenols because :

- (A) o-nitrophenol is more volatile in steam than those of m- and p-isomers.
 (B) o-nitrophenol shows intramolecular H-bonding
 (C) o-nitrophenol shows intermolecular H-bonding
 (D) melting point of o-nitrophenol is lower than those of m- and p-isomers

166.
$$\text{CH}_3 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH} = \text{CH}_2 \xrightarrow{\text{D}^+/\text{H}_2\text{O}} \text{A};$$

 A (major product) is :

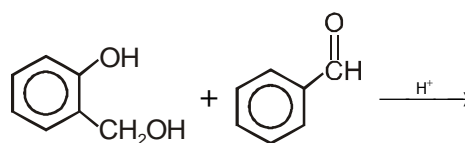
- (A)
$$\text{CH}_3 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CHD} - \text{CH}_2 - \text{OH}$$

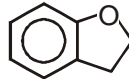
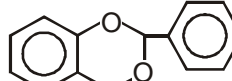
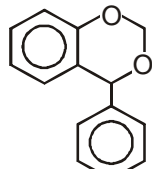
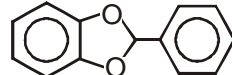
 (B)
$$\text{CH}_3 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \overset{\text{OH}}{\underset{|}{\text{CH}}} - \text{CH}_2 - \text{D}$$

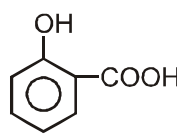
 (C)
$$\text{CH}_3 - \overset{\text{C}(\text{OH})\text{CHDCH}_3}{\underset{|}{\text{CH}_3}}$$

 (D)
$$\text{CH}_3 - \overset{\text{C}(\text{OH})\text{CH}_2 - \text{CH}_2 - \text{D}}{\underset{|}{\text{CH}_3}}$$

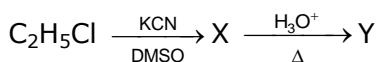
167. The product obtained in the following reaction is :



- (A) 
 (B) 
 (C) 
 (D) 

168.  + R $\xrightarrow{\text{H}_2\text{SO}_4(\text{conc.})}$ oil of wintergreen smell ; R is
 (A) $\text{C}_6\text{H}_5 - \text{OH}$ (B) $\text{CH}_3 - \text{OH}$
 (C) $\text{C}_2\text{H}_5 - \text{OH}$ (D) $\text{CH}_3 - \text{COCl}$

169. Consider the following sequence of reaction :



The products (X) and (Y) are, respectively :

- (A) $\text{C}_2\text{H}_5\text{CN}$ and $\text{C}_2\text{H}_5\text{CH}_2\text{NH}_2$
 (B) $\text{C}_2\text{H}_5\text{CN}$ and $\text{C}_2\text{H}_5\text{CONH}_2$
 (C) $\text{C}_2\text{H}_5\text{NC}$ and $\text{C}_2\text{H}_5\text{NHCH}_3$
 (D) $\text{C}_2\text{H}_5\text{CN}$ and $\text{C}_2\text{H}_5\text{COOH}$

170.
$$\text{Ph} - \text{CH}_3 \xrightarrow[\text{hv}]{\text{Cl}_2} (\text{A}) \xrightarrow{\text{aq.KOH}} (\text{B})$$

$$\xrightarrow{\text{Na}} (\text{C}) \xrightarrow{(\text{A})} (\text{D})$$

The end product (D) of the given sequence is:

- (A) $\text{Ph} - \text{CH}_2 - \text{O} - \text{Ph}$
 (B) $\text{Ph} - \text{CH}_2 - \text{CH}_2 - \text{Ph}$
 (C) $\text{Ph} - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{Ph}$
 (D)
$$\text{Ph} - \text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{Ph}$$

- 171.** Carbylamine test is performed by in alcoholic KOH by heating a mixture of :
 (A) Chloroform and silver powder
 (B) Trihalogenated methane and a primary amine
 (C) An alkyl halide and a primary amine
 (D) An alkyl cyanide and a primary amine
- 172.** Which is most difficult to oxidise :
 (A) HCHO (B) CH₃CHO
 (C) CH₃COCH₃ (D) CH₃CH₂CHO
- 173.** Mendius reaction involves the reduction of :
 (A) Alkyl cyanides
 (B) Alkyl isocyanides
 (C) Oximes
 (D) Nitroalkanes
- 174.** The compound obtained by the reaction between primary amine and aldehyde is:
 (A) An amide (B) Imine
 (C) Nitrite (D) Nitro
- 175.** The process requiring the absorption of energy is -
 (A) $F \rightarrow F^-$ (B) $Cl \rightarrow Cl^-$
 (C) $O \rightarrow O^{2-}$ (D) $H \rightarrow H^-$
- 176.** N₂ and O₂ are converted to monocations N₂⁺ and O₂⁺ respectively, which is wrong statement-
 (A) In N₂⁺, the N—N bond weakens
 (B) In O₂⁺, the O—O bond order increases
 (C) In O₂⁺, the paramagnetism decreases
 (D) N₂⁺ becomes diamagnetic
- 177.** The correct order of the O—O bond length in O₂, H₂O₂ and O₃ is -
 (A) O₃ > H₂O₂ > O₂
 (B) O₂ > H₂O₂ > O₃
 (C) O₂ > O₃ > H₂O₂
 (D) H₂O₂ > O₃ > O₂
- 178.** The metals Li, Na, K and Rb and their salts, when introduced into flame, give the following characteristic colour to flame -
 (A) Violet, Red violet, golden yellow and crimson red respectively
 (B) Red violet, violet, golden yellow and crimson red respectively
 (C) Crimson red, golden yellow, violet and Red violet respectively
 (D) Crimson red, Golden yellow, Red violet and Violet
- 179.** Nitrolim is a -
 (A) Mixture of calcium carbide and nitrogen
 (B) Mixture of calcium cyanamide and carbon
 (C) Mixture of calcium cyanide and carbon
 (D) Mixture of NH₄CN and CaCN
- 180.** The type of isomerism present in nitropenta amine chromium (III) chloride is-
 (A) linkage (B) ionisation
 (C) Both (D) None
- 181.** The oxoacid of sulphur that does not contain bond between sulphur atoms is :
 (A) H₂S₂O₃ (B) H₂S₄O₆
 (C) H₂S₂O₄ (D) H₂S₂O₇
- 182.** The synonym for water gas when used in the production of methanol is :
 (A) laughing gas (B) natural gas
 (C) fuel gas (D) syn gas
- 183.** Out of following which one has maximum ionic character -
 (A) NaCl (B) KCl
 (C) CaCl₂ (D) MgCl₂
- 184.** Which of the following elements will have the lowest first ionisation energy ?
 (A) Mg (B) Rb
 (C) Li (D) Ca
- 185.** Which of the following element has the highest value of electron affinity -
 (A) Carbon (B) Oxygen
 (C) Fluorine (D) Neon

SECTION_B

- 186.** In a trigonal crystal. which statement is incorrect
 (A) All the axial length and axial angle are equal
 (B) All the three axial lengths are equal
 (C) All the three axial angles are equal
 (D) Two axial angles are same and one is different
- 187.** Maximum deviation from ideal gas is expected from :
 (A) $\text{NH}_3(\text{g})$ (B) $\text{H}_2(\text{g})$
 (C) $\text{N}_2(\text{g})$ (D) $\text{CH}_4(\text{g})$
- 188.** The heat of combustion of carbon to CO_2 is -393.5 kJ/mol . The heat released upon formation of 35.2 g of CO_2 from carbon and oxygen gas is :
 (A) -630 kJ (B) -3.15 kJ
 (C) -315 kJ (D) $+315 \text{ kJ}$
- 189.** For endothermic reaction when change in entropy is negative, then reaction is
 (A) not possible at any temperature
 (B) possible at low temperature
 (C) possible at all temperature
 (D) possible at high temperature
- 190.** Consider the following liquid - vapour equilibrium.
 Liquid \rightleftharpoons Vapour
 Which of the following relations is correct ?
 (A) $\frac{d \ln G}{dT^2} = \frac{\Delta H_v}{RT^2}$ (B) $\frac{d \ln P}{dT} = \frac{-\Delta H_v}{RT}$
 (C) $\frac{-\Delta H_v}{RT} = \frac{-\Delta H_v}{T^2}$ (D) $\frac{d \ln P}{dT} = \frac{\Delta H_v}{RT^2}$
- 191.** The reaction Produces
 $\text{HC} \equiv \text{C}-\text{CH} = \text{CH}_2 + \text{HCl} \text{ (1 mole)} \longrightarrow ?$
 (A) $\text{HC} \equiv \text{C}-\underset{\text{Cl}}{\text{CH}}-\text{CH}_3$
 (B) $\text{H}_2\text{C} = \underset{\text{Cl}}{\text{C}}-\text{CH} = \text{CH}_2$
 (C) $\text{H}_2\text{C} = \text{C} = \text{CH}-\text{CH}_2\text{Cl}$
 (D) $\text{ClCH} = \text{C} = \text{CHCH}_3$
- 192.** Which one of the following on treatment with 50% aq. NaOH yields the corresponding alcohol and acid salt
 (A) $\text{C}_6\text{H}_5\text{CHO}$ (B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$
 (C) CH_3COCH_3 (D) CH_3CHO
- 193.** All the following are composed only of glucose except:
 (A) lactose (B) amylose
 (C) cellulose (D) maltose
- 194.** Natural polymer among the following is :
 (A) Nylon (B) Glyptal
 (C) Cellulose (D) Terylene
- 195.** Which of the following is not a narcotic :
 (A) Codeine (B) Brown Sugar
 (C) Diclofenac (D) Morphine
- 196.** B_4C is also known as -
 (A) Cast steel
 (B) Carbo boron
 (C) Boron carbide
 (D) Carbon steel with boron impurity
- 197.** Ge (II) compounds are powerful reducing agents, whereas Pb (IV) compounds are strong oxidants. It can be due to -
 (A) Lead is more electropositive than germanium
 (B) The ionization potential of lead is less than that of germanium
 (C) The ionic radii of Pb^{2+} and Pb^{4+} are larger than those of Ge^{2+} and Ge^{4+}
 (D) More pronounced inert pair effect in lead than in germanium
- 198.** Which one of the following on heating will give mixture of SO_2 and SO_3 ?
 (A) ZnSO_3 (B) CuSO_4
 (C) Na_2SO_4 (D) FeSO_4
- 199.** In a complex :
 (A) primary valency is ionisable
 (B) primary valency is non-ionisable
 (C) secondary valency is ionisable
 (D) None of these
- 200.** In zone refining, pure metal is obtained at the
 (A) Right end, if zone is travelling from left to right
 (B) Left end, if zone is travelling from left to right
 (C) Left end, if zone is travelling from right to left
 (D) Centre, if zone is travelling from any side